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METHOD FOR PREPARING HARDENABLE SYNTHETIC RESIN-CONTAINING CARRIERS  
SHEETS FOR SURFACE IMPROVEMENT

[Verfahren zur Herstellung von härtbarem Kunstharz enthaltenden  
Trägerbahnen für die Oberflächenvergütung]

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This invention relates to a method of producing impregnated /1\*  
carrier sheets in accordance with the double impregnation method with  
quick-hardening aminoplast resins, which produce gloss speck-free  
surfaces after being pressed on wood plates, in particular, with hot  
removal.

One example of a double impregnation method is the method  
described in German Patent 1 053 303. In this case, the carrier  
sheets are first preimpregnated with the solution of a resin that is  
highly flowable during molding and then, after optional intermediate  
drying, with the solution of a resin that is less flowable during  
molding and quick-hardening. Methods are also known in which  
impregnation and coating are undertaken with the same resin solution.

For the purposes of this invention, aminoplast resins are urea, /2  
thiourea, and melamine formaldehyde resins, which may also be present  
in mixtures or as mixed condensates.

Such impregnated carrier sheets, particularly paper webs,  
impregnated with hardenable synthetic resins in the double  
impregnation method, are widely used for the surface improvement of  
wood materials such as wood plates, wood fiber plates, veneer plates,  
and the like.

The carrier sheets are impregnated or coated with approximately  
the same to three times the amount of their own weight of hardenable  
synthetic resin.

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\* Numbers in the margin indicate pagination in the foreign text.

For surface improvement of the wood materials, these aminoplast-resin-containing carrier sheets are pressed onto the wood plates under pressure and heat, so that the synthetic resin hardens. During the pressing and hardening process, the resin flows, so that a closed synthetic-resin surface can be formed and, at the same time, the resin-impregnated carrier sheet is joined to the wood material. Clamping plates are used during this pressing. If the hardened synthetic resin surface is to reflect by and large the surface structure of the clamping plates, recooling under mold pressure is needed. This is true, in particular, if the gloss of the clamping /3 plates is to produce high-gloss synthetic resin surfaces.

The recooling requires time and energy. With newer methods, the pressing of paper webs with hardenable synthetic resins without high-gloss surfaces in the double impregnation method occurs without recooling, in order to increase the efficiency of the method. In this way, a deliberate decision is made to accept less gloss.

The object of the present invention is to create carrier sheets modified with aminoplast resins, with which it is possible to achieve higher gloss values during pressing of wood plates, even without recooling.

Surprisingly, this can be accomplished if the carrier sheets are preimpregnated with an aqueous, quick-hardening aminoplast resin and coated on one or both sides with a mixture of an aqueous, quick-

hardening aminoplast resin and a dispersion of a self-crosslinking acrylic resin.

For the purposes of this invention, self-crosslinking acrylic resin dispersions are dispersions prepared by polymerization or copolymerization of acrylic and/or methacrylic acid or their derivatives that still contain reactive groups. Suitable derivatives of acrylic and/or methacrylic acid are, above all, the esters, nitriles, and amides of these acids. Suitable reactive groups are, in particular, hydroxymethyl groups bound to the amide nitrogen that can react with themselves and with the hydroxymethyl and amino groups of the aminoplast resin. /4

The amount of acrylic resin in the coating resin is preferably 20 to 75 wt%, in particular 40 to 60 wt%.

In order not to have a negative impact on the good hardness of crosslinked aminoplast resin surfaces, such self-crosslinking acrylic resin dispersions are preferably used that, in pure form at room temperature, form hard films in which the transition from the vitreous state to the thermoelastic or thermoplastic state occurs only above room temperature.

The preimpregnated carrier sheet can be coated on one or both sides with the aminoplast resin that has been modified with acrylic resin.

If the case of coating on one side, the side of the carrier sheet is coated that faces the clamping plate during subsequent pressing. Preimpregnation of the carrier sheet is then undertaken in such a way that the back side receives sufficient resin to provide reliable adhesion to the wood material. /5

For a one-sided coating 15 to 50 g/m<sup>2</sup> solvent-free coating resin, preferably 25 to 35 g/m<sup>2</sup>, is applied; for two-sided coating, the amount is doubled, unless the back side is to receive a weaker coating.

A drying step may be inserted between preimpregnation and coating. The preimpregnated carrier sheet is preferably dried to a volatiles content of less than 30 wt% and then coated.

The resistance of such hardened surfaces to chemical and mechanical attack is fully retained. Improvements are even found compared to the aminoplast resin surfaces containing no acrylic resin, when it comes to weathering influences and various chemical reagents.

The addition of plastic dispersions to aminoplast resins for impregnating carrier sheets is known, to be sure. It is also known that plastic dispersions cause a plastification of the aminoplast resin, increase the flow of the resin during the hardening process, and increase the cracking resistance of pressed, resin impregnated carrier sheets. Thus the addition of polyvinyl acetate, polyvinyl /6

propionate, polyvinyl chloride dispersions, among other substances, has been recommended.

It is a disadvantage, of course, that such additives slow the hardening rate of the aminoplast resins, so that the preparation of quick-hardening, hot removable aminoplast-resin-impregnated carrier sheets has not been possible thus far. Moreover, in most cases the addition of polymers to aminoplast impregnating resins increases the flow of the resin during pressing so sharply that it leads to "emaciation" of the surface with respect to resin, due to the strong flow of resin below the surface or to the side. In all previous attempts at modification with chained polymers this, together with the above-mentioned delay in hardening, led to matte or gloss-specked surfaces.

If an attempt was made to increase the hardening rate by the excessive addition of latent hardeners or to decrease the strong flow to below the surface or to the side, then pressing resulting in non-closed, porous surfaces. Moreover, such films had a much shorter shelf life. /7

It was therefore surprising that the present invention has made it possible to produce resin-impregnated carrier sheets that, pressed onto wood in short-cycle presses, produce surfaces that are high-gloss and speck-free, even after hot removal.

The present invention will be explained in greater detail below with the help of the following examples:

### Example 1

A white, pigmented, absorbent alpha paper having a mass per unit area of  $80 \text{ g/m}^2$  is impregnated with a commercially available aqueous melamine resin solution with a solids content of ca. 55 wt% after the addition of a latent hardener, e.g., N-methylethanol ammonium acetate, dried for one minute at  $130^\circ\text{C}$ , and further condensed in the process. The mass per unit area is ca.  $160 \text{ g/m}^2$ . The volatile component content is ca. 15%.

A mixture of the commercially available melamine resin solution, /8 with a latent hardener added, and a self-crosslinking, 60-wt% acrylic resin dispersion, commercially available under the name "Plextol DV 580," is applied to both sides of the preimpregnated paper web. The amount of acrylic resin in the solvent-free coating resin is 55%.

The paper web, coated on both sides, is dried and condensed for 2 minutes at  $130^\circ\text{C}$ . The mass per unit area is  $205 \text{ g/m}^2$ . The volatile component content is ca. 6.8%.

The impregnated paper web, doubly impregnated with synthetic resin, is pressed against a high-gloss polished, chromed brass sheet at  $160^\circ\text{C}$  under a pressure of  $15 \text{ kp/cm}^2$  for 60 seconds on a wood plate and demolded hot. A high-gloss surface results.

A synthetic resin-impregnated paper web prepared in the same manner, but without the addition of the self-crosslinking acrylic resin dispersion, similarly pressed, had a lower gloss that was uneven over the surface.



A white, pigmented, absorbent balance paper having a mass per unit area of  $120 \text{ g/m}^2$  is impregnated with a mixture of a commercially available, aqueous, 55-wt% melamine resin solution and a commercially available, aqueous, 50-wt% urea resin solution after the addition of a latent hardener, dried for one minute at  $140^\circ\text{C}$ , and further condensed in the process. The amount of urea resin in the preimpregnation resin is 30%. The mass per unit area is  $270 \text{ g/m}^2$  and the amount of volatile components 20%.

On the top side of the preimpregnated paper web, a mixture of commercially available melamine resin solution with hardener added and a self-crosslinking, 45-wt% acrylic resin dispersion, which is commercially available under the name Primal H A-16, is applied, dried for 1.5 minutes at  $140^\circ\text{C}$ , and precondensed. The amount of acrylic resin in the coating resin is 40%. The mass per unit area is  $260 \text{ g/m}^2$  and the amount of volatile components 6.5%.

The preimpregnated and paper web, coated on one side, is pressed under a pressure of  $18 \text{ kp/cm}^2$  at  $170^\circ\text{C}$  for 40 seconds on a wood plate using a high-gloss polished, chromed clamping plate and with hot removal. The result is a synthetic resin surface with a higher /10 degree of gloss than a similarly produced coating without the acrylic resin dispersion.

1. A method of producing impregnated carrier sheets in accordance with the double impregnation method with quick-hardening aminoplast resins, which produce gloss speck-free surfaces after being pressed on wood plates, in particular, with hot removal, characterized in that the carrier sheets are preimpregnated with an aqueous, quick-hardening aminoplast resin and coated on one or both sides with a mixture of an aqueous, quick-hardening aminoplast resin and a dispersion of a self-crosslinking acrylic resin.

2. A method as recited in Claim 1, characterized in that the amount of acrylic resin in the coating resin is 20 to 75 wt%, preferably 40 to 60 wt%.

3. A method as recited in Claim 1 or 2, characterized in that the glass transition range of the self-crosslinking acrylic resin is above room temperature.